

REMARKS

Claims 1-16 are pending. Claims 1-5 and 7-10 are rejected. Claim 6 is objected to. In this Amendment, claims 1, 3, 6, 7 and 9 have been amended, and new claims 11-16 have been added. Support for the amendments can be found throughout the application, as well as in the claims as originally filed. No new matter is added.

Applicants thank the Examiner for the indication that claims 5 and 6 would be allowable if rewritten in independent form to overcome the 35 U.S.C. § 112, second paragraph, rejection thereof. Because claim 6 has been amended to overcome the 35 U.S.C. § 112, second paragraph, rejection and because the remainder of the pending claims are allowable at least for the reasons discussed below, Applicants respectfully submit that the entire application is in a condition for allowance.

Claim 6 has been objected to under 37 C.F.R. 1.75(c). As suggested by the Examiner, claim 6 has been rewritten in independent form. Thus, reconsideration and withdrawal of the objection to claim 6 are respectfully requested.

Claims 1-16 are submitted for further consideration in view of the below remarks. Applicants respectfully request reconsideration and withdrawal of all rejections.

Claims 1-4, and 6-10 have been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Applicants respectfully submit that this rejection is overcome in light of the claim amendments indicated herein. Applicants therefore respectfully request that the rejections be withdrawn.

Claims 1-3 and 6-9 have been rejected under 35 U.S.C. 103(a) as obvious over Arcella et al. (U.S. Patent No. 6,509,073) in view of Stoepelmann (U.S. Patent No.

5,869,157). Applicants respectfully traverse this rejection as it may apply to the amended claims.

The technical problem addressed by the present invention is the production of multilayer articles having a very high adhesion between a layer A1 of ethylene (E)/chlorotrifluoroethylene (CTFE) (or ethylene/tetrafluoroethylene (E/TFE)) polymer and a layer B1 of polyamide polymer, said polymers A1 and B1 showing no adhesion each to other when directly coupled (see Specification, pages 13-14, comparative example 4 and pages 18-19, comparative example 10).

There was a need for multilayer articles combining the excellent mechanical properties of polyamide with the good chemical resistance properties of fluorinated copolymers E/CTFE (or E/TFE) showing adhesion among the layers in that the above combination of properties is specifically requested for fuel lines application.

The problem was solved by providing between the above polymer layers A1 and B1 an intermediate bi-layer A/B made of a layer A of copolymers of E, CTFE (or TFE) and an acrylic monomer of formula (a) and a layer B made of a polyamide having a content of -NH₂ end groups ranging from 40 to 300 μ eq/g (see Claim 1). Said intermediate bi-layer A/B shows not only a very high adhesion between layer A and layer B but also very a high adhesion between layer A1 and layer B1 (see Specification, page 4, line 3 to page 5, line 6, and pages 19-20, Example 11).

Arcella et al. disclose a thermoprocessable composition of fluorinated copolymers of E, CTFE (or TFE) and an acrylic monomer of formula (a) comprising a crosslinking agent (Arcella et al., column 1, line 62 to column 2, line 10, and claim 1).

The thermoprocessable composition of Arcella et al. can be coupled to a layer made of a thermoplastic or elastomeric hydrogenated resin such as nitrile rubbers (NBR), ethylene-propylene rubbers (EPM), ethylene-propylene-diene rubbers (EPDM), polyvinylchloride (PVC), nitrile NBR rubbers mixed with PVC (NVC), cellulose polymers, polyacrylbutadienestyrene (ABS), or polyurethanes including polyamide (Arcella et al., column 2, line 54 to column 3, line 23). In fuel line applications, the composition and the polyamide are coextruded and then the whole is irradiated with ionizing radiations (Arcella et al., column 3, lines 25-30).

There is no teaching or suggestion in Arcella et al. of a bilayer made of the fluoropolymer composition and polyamide. Thus, Arcella et al. suggest that a layer made of copolymers of E, CTFE (or TFE) and acrylic monomer (a) can adhere to polyamides in general containing a crosslinking agent.

Applicants have demonstrated that a copolymer of E, CTFE (or TFE) and an acrylic monomer (a) without crosslinking agents adhere only to particular polyamides having a content of -NH₂ end group higher than 40 μ eq/g (compare Examples 1 and 3 to comparative Example 2). The unexpected adhesion achieved by using polyamides having a content of -NH₂ end group higher than 40 μ eq/g and a fluoropolymer of E, CTFE (or TFE) and an acrylic monomer of formula (a) without crosslinking agent supports the nonobviousness of the present multilayer manufactured articles.

Stoeppelmann discloses a bilayer formed by a layer of a fluoropolymer and a layer of polyamide, which are adhered to each other by means of an adhesion promoter composition formed by a polyamide having an excess of -NH₂ end groups, with respect

to -COOH end groups, necessarily admixed with a diamine (Stoeppelmann, claim 1). In particular, Stoeppelmann describes a polyamide having 50 $\mu\text{eq/g}$ of -NH₂ end groups admixed with a diamine, which is used to adhere to a fluoropolymer (Stoeppelmann, column 4, lines 1-19). For the fluoropolymer layer, Stoeppelmann primarily describes terpolymers based on THV (TFE/HFP/VDF) (Stoeppelmann, column 5, lines 42-43, and claim 2). Stoeppelmann also mentions terpolymers based on TFE, PMVE and VDF as being suitable for the fluoropolymer layer (Stoeppelmann, column 4, lines 27-30).

Stoeppelmann does not specifically teach or suggest a layer of polyamides having a content of -NH₂ end groups ranging from 40 to 300 $\mu\text{eq/g}$ not admixed with diamine as taught by the presently claimed invention.

Stoeppelmann teaches away from the limitations of the presently claimed invention by disclosing that polyamides with an excess of -NH₂ that are not admixed with a diamine do not adhere to fluoropolymers (Stoeppelmann, column 3, lines 5-10). In particular, the table at column 6 discloses in Example 1 that a polyamide PA1 having 50 $\mu\text{eq/g}$ not admixed with a diamine, does not adhere (there is mechanical separation between the layers after extrusion and after storing) to the fluoropolymer of THV (TFE, HFP, VDF).

Accordingly, the specification and the examples of Stoeppelmann teach away from using the polyamides not admixed with diamine, in order to have high adhesion to fluoropolymer. Thus, the presently claimed invention would not have been obvious to one of skill in the art from the teachings of Stoeppelmann.

Applicants have found that polyamides having a content of -NH₂ end groups from

40 to 300 μ eq/g but not admixed with diamine, adhere to particular fluoropolymer formed by E, CTFE (or TFE) and acrylic monomer (a) (Specification, Examples 1, 3, 6, 8, and 11). The unexpected adhesion obtained by using polyamides having a content of $-\text{NH}_2$ end group higher than 40 μ eq/g, without a diamine, and the fluoropolymer E/CTFE (or TFE)/acrylic monomer (a), supports the nonobviousness of the present multilayer articles over Stoepelmann.

Furthermore, the combination of Arcella et al. and Stoepelmann would not have resulted in the multilayer articles of present claim 1, in that contrary to the presently claimed invention:

the resulting fluoropolymer layer would always contain a crosslinking agent which is not a technical feature of the present fluoropolymer layer A1);

the resulting multilayer would always be irradiated with ionizing radiation which is not a technical feature of the present multilayer;

the resulting multilayer would always contain a layer made of a polyamide having an excess of $-\text{NH}_2$ end groups necessarily admixed with diamine which is not a technical feature of the present multilayer.

Applicants respectfully submit that by combining the teachings of Arcella et al. and Stoepelmann, one of skill in the art would not have found any motivation to remove the crosslinking agent from the fluoropolymer layer of Arcella et al. and then to insert in the resulting bilayer the layer of Stoepelmann made of polyamide admixed with a diamine.

Regarding claim 6, which has been rewritten in independent form, Applicants

respectfully refer to the above considerations. In particular, Applicants wish to bring the Examiner's attention to the fact that Stoeppelmann teaches that the polyamides balanced with the amino end groups and admixed with diamine, do not show adhesion to fluoropolymers (Stoeppelmann, column 3, lines 5-10). In contrast, Applicants have demonstrated in the Specification of the presently claimed invention that a polyamide having a content of -NH₂ end groups of 22 μeq/g admixed with 1% of a diamine adheres to the instant fluoropolymer made of E, CTFE (or TFE) and acrylic monomer (a) (Example 8).

Therefore, Arcella et al. in view of Stoeppelmann would not have taught or suggested the limitations of claims 1-3 and 6-9 of the presently claimed invention and the specific unexpected advantages achieved due to such limitations. Thus, the presently claimed invention would not have been obvious over Arcella et al. in view of Stoeppelmann. Reconsideration and withdrawal of the rejection of claims 1-3 and 6-9 under 35 U.S.C. § 103(a) are respectfully requested.

Claim 10 was rejected under 35 U.S.C. § 103(a) as being obvious over Arcella et al. (U.S. Patent No. 6,509,073) in view of Stoeppelmann (U.S. Patent No. 5,869,157) and further in view of Krause et al. (U.S. Patent No. 5,958,532). Applicants respectfully traverse this rejection.

Applicants repeat the above discussion as to the nonobviousness of independent claim 1. Applicants note that claim 10 is dependent from claim 1.

Krause et al. disclose a fuel hose comprising two fluoropolymers and one elastomer layer wherein the inner fluoropolymer layer is conductive (Specification,

column 2, lines 23-29). Krause et al. in combination with Arcella et al. and Stoeppelmann would not have taught or suggested the multilayer articles of the presently claimed invention comprising polyamides having a content of –NH₂ end groups between 40-300 μeq/g.

Therefore, Arcella et al. in view of Stoeppelmann, in further view of Krause et al., would not have taught or suggested the limitations of claim 10 of the presently claimed invention and the specific unexpected advantages achieved due to such limitations. Thus, the presently claimed invention would not have been obvious over Arcella et al. in view of Stoeppelmann, in further view of Krause et al. Reconsideration and withdrawal of the rejection of claim 10 under 35 U.S.C. § 103(a) are respectfully requested.

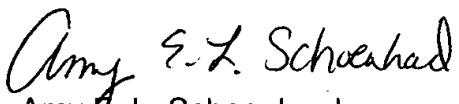
Claims 1-3 and 6-9 have been rejected as not being patentably distinct under the doctrine of obviousness-type double patenting over claims 21, 22, and 24 of Arcella et al. (U.S. Patent No. 6,509,073) in view of Stoeppelmann (U.S. Patent No. 5,869, 157). Claim 10 has been rejected under the doctrine of obviousness-type double patenting as being unpatentable over claims 21, 22, and 24 of Arcella et al. (U.S. Patent No. 6,509,073) in view of Stoeppelmann (U.S. Patent No. 5,869, 157), and further in view of Krause et al. (U.S. Patent No. 5,958,532). As suggested by the Examiner, Applicants are enclosing a terminal disclaimer in compliance with 37 CFR 1.321(c) to overcome the double patenting rejection. Thus, Applicants respectfully request that the rejections be withdrawn.

In view of the amendments and remarks above, Applicants respectfully submit that this application is in condition for allowance and request favorable action thereon.

In the event this paper is not considered to be timely filed, Applicants hereby petition for an appropriate extension of time. The fee for this extension may be charged to our Deposit Account No. 01-2300. The Commissioner is hereby authorized to charge any fee deficiency or credit any overpayment associated with this communication to Deposit Account No. 01-2300, referencing Attorney Docket No. 108910-00057.

Respectfully submitted,

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